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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Peter Michael Edic et al.	§		
	§	Group Art Unit:	2882
Serial No.: 10/625,321	§		
	§	Examiner:	Ho, Allen C.
Filed: July 23, 2003	§		
For: METHOD AND APPARATUS FOR GENERATING TEMPORALLY INTERPOLATED PROJECTIONS	§	Atty. Docket:	GERD:0052/YOD/RAR 120521-2

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March 8, 2007 — Floron C. Faries

Date — Floron C. Faries

APPEAL BRIEF PURSUANT TO 37 C.F.R. §§ 41.31 AND 41.37

This Appeal Brief is being filed in furtherance to the Notice of Appeal mailed on January 4, 2007, and received by the Patent Office on January 8, 2007

The Commissioner is authorized to charge the requisite fee of $500.00, and any additional fees which may be necessary to advance prosecution of the present application, to Account No. 07-0868, Order No. 120521-2/YOD/RAR (GERD:0052).

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Conclusion

Appellants respectfully submit that all pending claims are in condition for allowance. However, if the Examiner or Board wishes to resolve any other issues by way of a telephone conference, the Examiner or Board is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

Date: March 8, 2007

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1. **REAL PARTY IN INTEREST**

The real party in interest is General Electric Company, the Assignee of the above-referenced application by virtue of the Assignment to General Electric Company, recorded at reel 014336, frame 0624, and dated July 23, 2003. Accordingly, General Electric Company will be directly affected by the Board's decision in the pending appeal.

2. **RELATED APPEALS AND INTERFERENCES**

Appellants are unaware of any other appeals or interferences related to this Appeal. The undersigned is Appellants' legal representative in this Appeal.

3. **STATUS OF CLAIMS**

Claims 1-7, 9-15, 17-23, 25 and 26 are currently under final rejection and, thus, are the subject of this Appeal. Claims 8 and 24 have been cancelled.

4. **STATUS OF AMENDMENTS**

As the instant claims have not been since the last Final Office Action, there are no outstanding amendments to be considered by the Board.

5. **SUMMARY OF CLAIMED SUBJECT MATTER**

The present invention relates generally to the field of medical imaging and more specifically to the field of imaging dynamic, internal tissue, such as cardiac tissue, by computed tomography. *See* Application, page 1, lines 11-13. In particular, the present invention relates to the generation and reconstruction of temporally interpolated projection data. *See* page 1, lines 13 and 14. The Application contains 4 independent claims, namely, claims 1, 9, 17 and 25, all of which are the subject of this Appeal. The subject matter of these claims is summarized below.

Independent claim 1 generally recites a method for acquiring a projection data set (e.g., projection data 120), including: rotating a distributed X-ray source (e.g., distributed source of X-ray radiation 12) about a volume of interest (e.g., human patient 18, aperture

56), wherein a rotational period of the distributed X-ray source is greater than eight seconds and wherein the distributed X-ray source comprises a plurality of addressable X-ray focal spots (e.g., focal points 62); emitting X-rays (e.g., radiation 16) from the distributed X-ray source; and acquiring a projection data set comprising a plurality of projections generated from the emitted X-rays (e.g., see reference numerals 92, 116, 118 in the method of FIG. 4). *See* Application, page 5, line 12 – page 6, line 25; page 7, lines 1-27; page 8, line 19 – page 9, line 17; page 10, line 27 – page 11, line 12; page 12, lines 15-21; Figures 1,2, and 4.

Independent claim 9 generally recites a computer program, provided on one or more computer readable media, for acquiring a projection data set (e.g., projection data 120), including: a routine for rotating a distributed X-ray source (e.g., distributed source of X-ray radiation 12) about a volume of interest (e.g., human patient 18, aperture 56), wherein a rotational period of the distributed X-ray source is greater than eight seconds and wherein the distributed X-ray source comprises a plurality of addressable X-ray focal spots (e.g., focal points 62); a routine for emitting X-rays (e.g., stream of radiation 16) from the distributed X-ray source; and a routine for acquiring a projection data set comprising a plurality of projections generated from the emitted X-rays (e.g., see reference numerals 92, 116, 118 in the method of FIG. 4). *See* Application, page 5, line 12 – page 6, line 25; page 7, lines 1-27; page 8, line 19 – page 9, line 17; page 10, line 27 – page 11, line 12; page 12, lines 15-21; Figures 1,2, and 4.

Independent claim 17 generally recites a CT image analysis system (imaging system 10, CT scanning system 50), including: a distributed X-ray source (e.g., distributed source of X-ray radiation 12), disposed on a gantry (gantry 54), wherein the rotational period of the distributed X-ray source about a volume of interest (e.g., human patient 18, aperture 56) is greater than eight seconds, and wherein the distributed X-ray source comprises a plurality of addressable X-ray focal spots (e.g., focal points 62); a detector configured to detect radiation (e.g., stream of radiation 16) emitted by the distributed X-ray source and to generate one or more signals responsive to the radiation, wherein the detector comprises a plurality of detector elements (e.g., detector array 22); a system

controller (e.g., system controller 24) configured to control the X-ray source and to acquire a set of projection data (e.g., projection data 120) during one or more rotations of the X-ray source about a dynamic object (e.g., human patient 18) from one or more of the detector elements via a data acquisition system (e.g., data acquisition system 34); and a computer system (e.g., computer system 36) configured to receive the set of projection data. *See* Application, page 5, line 12 – page 6, line 25; page 7, lines 1-27; page 8, line 19 – page 9, line 17; page 10, line 27 – page 11, line 12; page 12, lines 15-21; Figures 1,2, and 4.

Independent claim 25 generally recites a CT image analysis system, including: means (e.g., gantry 54) for rotating a distributed X-ray source (e.g., distributed source of X-ray radiation 12) about a volume of interest (e.g., human patient 18, aperture 56), wherein the rotational period of the distributed X-ray source is greater than eight seconds, and wherein the distributed X-ray source comprises a plurality of addressable X-ray focal spots (e.g., focal points 62); means (e.g., distributed source 12) for emitting X-rays from the distributed X-ray source; and means (e.g., detector 22, data acquisition system 34) for acquiring a projection data set (e.g., projection data 120) comprising a plurality of projections generated from the emitted X-rays (e.g., see reference numerals 92, 116, 118 in the method of FIG. 4). *See* Application, page 5, line 12 – page 6, line 25; page 7, lines 1-27; page 8, line 19 – page 9, line 17; page 10, line 27 – page 11, line 12; page 12, lines 15-21; Figures 1,2, and 4.

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

First Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's first ground of rejection in which the Examiner rejected claims 1, 9, 17 and 25 under 35 U.S.C. § 103(a) as being unpatentable over Morgan (U.S. Patent No. 6,229,870 B1) in view of Casey *et al.* (U.S. Patent No. 5,175,754).

Second Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's second ground of rejection in which the Examiner rejected claims 2-5 and 10-13 under 35 U.S.C. § 103(a) as being unpatentable over Morgan (U.S. Patent No. 6,229,870 B1) in view of Casey *et al.* (U.S. Patent No. 5,175,754) as applied to claims 1 and 9, and further in view of Yamagishi (U.S. Patent No. 5,383,231).

Third Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's third ground of rejection in which the Examiner rejected claims 6, 7, 14, and 15 under 35 U.S.C. § 103(a) as being unpatentable over Morgan (U.S. Patent No. 6,229,870 B1), Casey *et al.* (U.S. Patent No. 5,175,754) and Yamagishi (U.S. Patent No. 5,383,231) as applied to claims 2 and 10 above, and further in view of Taguchi (U.S. Patent No. 6,466,640 B1).

Fourth Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's fourth ground of rejection in which the Examiner rejected claims 18-21 and 26 under 35 U.S.C. § 103(a) as being unpatentable over Morgan (U.S. Patent No. 6,229,870 B1) and Casey *et al.* (U.S. Patent No. 5,175,754) and in view of Yamagishi (U.S. Patent No. 5,383,231).

Fifth Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's fifth ground of rejection in which the Examiner rejected claims 22 and 23 under 35 U.S.C. § 103(a) as being unpatentable over Morgan (U.S. Patent No. 6,229,870 B1), Casey *et al.* (U.S. Patent No. 5,175,754), and Yamagishi (U.S. Patent No. 5,383,231) as applied to claim 18, and further in view of Taguchi (U.S. Patent No. 6,466,640 B1).

7. **ARGUMENT**

As discussed in detail below, the Examiner has improperly rejected the pending claims. Further, the Examiner has misapplied long-standing and binding legal precedents and principles in rejecting the claims under Section 103. Accordingly, Appellants respectfully request full and favorable consideration by the Board, as Appellants strongly believe that claims 1-7, 9-15, 17-23, 25 and 26 are currently in condition for allowance.

A. **Ground of Rejection No. 1:**

The Examiner rejected claims 1, 9, 17 and 25 under 35 U.S.C. § 103(a) as being unpatentable over Morgan (U.S. Patent No. 6,229,870 B1) in view of Casey *et al.* (U.S. Patent No. 5,175,754). Appellants respectfully traverse this rejection.

Legal Precedent

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (B.P.A.I. 1979). To establish a *prima facie* case, the Examiner must show that the combination includes all of the claimed elements, *and* also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984).

Indeed, when prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). The

Examiner must provide objective evidence, rather than subjective belief and unknown authority, of the requisite motivation or suggestion to combine or modify the cited references. *In re Lee*, 61 U.S.P.Q.2d. 1430 (Fed. Cir. 2002). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988).

In addition, it is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 U.S.P.Q. 769, 779 (Fed. Cir. 1983); M.P.E.P. § 2145. If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re* Ratti, 270 F.2d 810, 123 U.S.P.Q. 349 (CCPA 1959); *see* M.P.E.P. § 2143.01. Similarly, if a proposed modification renders the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. M.P.E.P § 2143.01 (citing *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)).

Features of Independent Claims Missing from the References

All independent claims 1, 9, 17, and 25 generally recite that the rotational period of the distributed X-ray source is *greater* than eight seconds. This feature is not taught or suggested by the cited references, whether the references are taken alone or in combination. Indeed, the Examiner acknowledged that Morgan does *not* disclose this feature. *See* Final Office Action, pages 2 and 3. However, the Examiner did rely on Casey to teach this feature. Yet, the largest value disclosed in Casey is 8 seconds, not *greater* than 8 seconds. Therefore, the independent claims (and their dependent claims) are believed to be patentable over the cited combination. Accordingly, Appellants respectfully request that the Board direct the Examiner to withdraw the rejection and allow the claims.

Improper Combination – Impermissible Hindsight

Appellants respectfully emphasize that there is no motivation to combine the Morgan and Casey references as asserted by the Examiner or as recited in the present claims. Indeed, Appellants respectfully stress that the Examiner has employed impermissible hindsight in combining the references as alleged. The Examiner suggested that modifying the Morgan invention to have a rotational period of greater than 8 seconds would be obvious since it would result in higher resolution images. *See* Final Office Action, pages 2-5. This reasoning, however, may only be true in limited circumstances as described in Casey, i.e., when motion is not present. *See* Casey, col. 2, lines 1-5. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).

Moreover, as implied in Morgan, Appellants respectfully contend that the trend in the relevant art is to *decrease* the period (i.e., *increase the rotation speed* of the source), in direct conflict to the Examiner's proposed modification of Morgan. *See* Morgan, col. 5, line 65 – col. 6, line 1 (explaining a scenario of "providing a maximum number of image slices in the shortest time."). Such a decrease in period and corresponding increase in rotation speed of the source is commonly desired to decrease the examination time so to increase patient comfort and/or patient throughput, for example. The Federal Circuit has warned that the Examiner must not "fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *See In re Dembiczak* 50 U.S.P.Q. 2d 52 (Fed. Cir.1999) (quoting *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 220 U.S.P.Q. 303, 313 (Fed. Cir.1983)); *see also In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988) (explaining that one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention).

Without a doubt, the Examiner's reasoning neglects the clear and obvious reasons (such as patient comfort, facility efficiency, and so forth) why one of ordinary skill in the art would *not* decrease gantry rotation speed in the manner described by the Examiner. To be sure, increasing gantry rotation speed in the manner described by the Examiner would also increase scan time, particularly if multiple rotations are contemplated. One of ordinary skill in the art might not view such a scan time/resolution tradeoff to be worthwhile beyond an eight second rotation period. Therefore, one of ordinary skill in the art would recognize that, beyond a certain point, increased scan time is not desirable for incrementally better resolution.

In addition, the Examiner's reasoning rests on the premise that by rotating the X-ray source of the Casey reference slower than eight seconds per rotation, more than 7,872 projections can actually be acquired, i.e., that the CT machine is capable of emitting X-rays at more than 7,872 angular positions. Casey, col. 1, line 61 – col. 2, line 5. Absent some showing by the Examiner that the commercial CT system as described in the Casey reference is actually capable of acquiring projection data at more than 7,872 angular positions in one rotation, one of ordinary skill in the art would *not* be motivated to increase scan time to merely get the *same* amount of projection data. In other words, once the number of projections that can be acquired in a rotation is maximized, the resolution is also maximized, and *simply rotating the X-ray source slower won't result in any improvement in resolution*, i.e., more projections won't be acquired. The Examiner ignored this point and provides no basis for why one of ordinary skill in the art would believe resolution could be increased by rotating an X-ray source for more than eight seconds. Again, Appellants respectfully assert that the Examiner has employed impermissible hindsight in attempting to modify the Morgan reference to read on the present claims. *See In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). For this additional reason, Appellants respectfully request that the Board direct the Examiner to withdraw the foregoing rejection and allow the claims.

Improper Combination – The References Teach Away

Further, Appellants respectfully emphasize with regard to the modification of Morgan proposed by the Examiner, the cited references teach away from one another and therefore are not properly combinable as desired by the Examiner. Neither the Casey nor Morgan references disclose a motivation for CT gantries to have rotational periods *greater* than eight seconds (lower rotational speeds). In fact, the Morgan reference makes *no* express disclosure concerning the rotational period of the X-ray source. To the extent that the Morgan reference is concerned with rotational period, Morgan discusses solving the problem of *long* imaging times and stresses that advantages of the Morgan invention include significantly improved imaging time and imaging in substantially real time. *See* Morgan, col. 1, lines 26-28, 38-39; col. 3, lines 1-5; and col. 5, line 65 – col. 6, line 1. Thus, the Morgan reference *teaches away* from using an X-ray source with a rotational period *greater* than eight seconds. In view of the stated motivations provided in Morgan for faster, even real-time, imaging, Morgan teaches away from the Examiner's proposal to modify Morgan to increase scan time. Accordingly, for this additional reason, Appellants respectfully request that the Board direct the Examiner to allow independent claims 1, 9, 17, and 25.

B. **Ground of Rejection No. 2:**

The Examiner rejected dependent claims 2-5 and 10-13 under 35 U.S.C. § 103(a) as being unpatentable over Morgan (U.S. Patent No. 6,229,870 B1) in view of Casey *et al.* (U.S. Patent No. 5,175,754) as applied to claims 1 and 9, and further in view of Yamagishi (U.S. Patent No. 5,383,231). Appellants respectfully traverse this rejection.

Dependent Claims

With regard to the dependent claims 2-5 and 10-13, the Examiner rejected these claims in view of the Morgan and Casey references in conjunction with Yamagishi (U.S. Patent No. 5,383,231). Yamagishi, however, fails to obviate the deficiencies of the Morgan and Casey references discussed above with regard to the independent claims.

Therefore, the claims respectively depending from independent claims 1, 9, 17, and 25 are believed to be allowable based on their dependency as well as for the unique features recited in each dependent claim. Moreover, there is no motivation to combine these disparate references cited by the Examiner. Accordingly, for these additional reasons, Appellants respectfully requests that the Examiner withdraw the foregoing rejections of the dependent claims 2-5 and 10-13.

C. **Ground of Rejection No. 3:**

The Examiner rejected claims 6, 7, 14, and 15 under 35 U.S.C. § 103(a) as being unpatentable over Morgan (U.S. Patent No. 6,229,870 B1), Casey *et al.* (U.S. Patent No. 5,175,754) and Yamagishi (U.S. Patent No. 5,383,231) as applied to claims 2 and 10 above, and further in view of Taguchi (U.S. Patent No. 6,466,640 B1). Appellants respectfully traverse this rejection.

Dependent Claims

With regard to the dependent claims 6, 7, 14, and 15, the Examiner rejected these claims in view of the Morgan and Casey references in conjunction with Yamagishi (U.S. Patent No. 5,383,231) and Taguchi (U.S. Patent No. 6,466,640 B1). Yamagishi and Taguchi, however, fail to obviate the deficiencies of the Morgan and Casey references discussed above with regard to the independent claims. Therefore, the claims respectively depending from independent claims 1, 9, 17, and 25 are believed to be allowable based on their dependency as well as for the unique features recited in each dependent claim. Moreover, there is no motivation to combine these disparate references cited by the Examiner. Accordingly, for these additional reasons, Appellants respectfully requests that the Examiner withdraw the foregoing rejections of the dependent claims 6, 7, 14, and 15.

D. **Ground of Rejection No. 4:**

The Examiner rejected claims 18-21 and 26 under 35 U.S.C. § 103(a) as being unpatentable over Morgan (U.S. Patent No. 6,229,870 B1) and Casey *et al.* (U.S. Patent No. 5,175,754) and in view of Yamagishi (U.S. Patent No. 5,383,231). Appellants respectfully traverse this rejection.

Dependent Claims

With regard to the dependent claims 18-21 and 26, the Examiner rejected these claims in view of the Morgan and Casey references in conjunction with Yamagishi (U.S. Patent No. 5,383,231). Yamagishi, however, fails to obviate the deficiencies of the Morgan and Casey references discussed above with regard to the independent claims. Therefore, the claims respectively depending from independent claims 1, 9, 17, and 25 are believed to be allowable based on their dependency as well as for the unique features recited in each dependent claim. Moreover, there is no motivation to combine these disparate references cited by the Examiner. Accordingly, for these additional reasons, Appellants respectfully requests that the Examiner withdraw the foregoing rejections of the dependent claims 18-21 and 26.

E. **Ground of Rejection No. 5:**

The Examiner rejected claims 22 and 23 under 35 U.S.C. § 103(a) as being unpatentable over Morgan (U.S. Patent No. 6,229,870 B1), Casey *et al.* (U.S. Patent No. 5,175,754), and Yamagishi (U.S. Patent No. 5,383,231) as applied to claim 18 above, and further in view of Taguchi (U.S. Patent No. 6,466,640 B1). Appellants respectfully traverse this rejection.

Dependent Claims

With regard to the dependent claims 22 and 23, the Examiner rejected these claims in view of the Morgan and Casey references in conjunction with Yamagishi (U.S. Patent No. 5,383,231) and Taguchi (U.S. Patent No. 6,466,640 B1). Yamagishi and Taguchi, however, fail to obviate the deficiencies of the Morgan and Casey references

discussed above with regard to the independent claims. Therefore, the claims respectively depending from independent claims 1, 9, 17, and 25 are believed to be allowable based on their dependency as well as for the unique features recited in each dependent claim. Moreover, there is no motivation to combine these disparate references cited by the Examiner. Accordingly, for these additional reasons, Appellants respectfully requests that the Examiner withdraw the foregoing rejections of the dependent claims 22 and 23.

8. **APPENDIX OF CLAIMS ON APPEAL**

1. A method for acquiring a projection data set, comprising:

rotating a distributed X-ray source about a volume of interest, wherein a rotational period of the distributed X-ray source is greater than eight seconds and wherein the distributed X-ray source comprises a plurality of addressable X-ray focal spots;

emitting X-rays from the distributed X-ray source; and

acquiring a projection data set comprising a plurality of projections generated from the emitted X-rays.

2. The method as recited in claim 1, further comprising:

generating a set of interpolated projections by interpolating the projection data set using a set of concurrently acquired phase data and frequency content of the projection data set, wherein each interpolated projection characterizes the projection data set at a view location of the distributed X-ray source and at a particular time; and

reconstructing the set of interpolated projections to generate one or more images.

3. The method as recited in claim 2, further comprising:

associating two or more images to generate a volume rendering.

4. The method as recited in claim 2, wherein the volume of interest comprises a heart having a cardiac period.

5. The method as recited in claim 4, wherein a rotational period of the distributed X-ray source about the heart is approximately a multiple of the cardiac period.

6. The method as recited in claim 2, wherein interpolating the projection data set comprises reducing statistical noise in the projection data set.

7. The method as recited in claim 6 further comprising reducing an X-ray dose applied to the volume of interest in response to the reduction in statistical noise.

9. A computer program, provided on one or more computer readable media, for acquiring a projection data set, comprising:

a routine for rotating a distributed X-ray source about a volume of interest, wherein a rotational period of the distributed X-ray source is greater than eight seconds and wherein the distributed X-ray source comprises a plurality of addressable X-ray focal spots;

a routine for emitting X-rays from the distributed X-ray source; and

a routine for acquiring a projection data set comprising a plurality of projections generated from the emitted X-rays.

10. The computer program as recited in claim 9, further comprising:

a routine for generating a set of interpolated projections by interpolating the projection data set using a set of concurrently acquired phase data and the frequency content of the projection data set, wherein each interpolated projection characterizes the projection data set at a view location of the distributed X-ray source and at a particular time; and

a routine for reconstructing the set of interpolated projections to generate one or more images.

11. The computer program as recited in claim 10, a further comprising:

a routine for associating two or more images to generate a volume rendering.

12. The computer program as recited in claim 10, wherein the volume of interest comprises a heart having a cardiac period.

13. The computer program as recited in claim 12, wherein the routine for rotating the distributed X-ray source rotates the distributed X-ray source in a rotational period approximately equal to a multiple of the cardiac period.

14. The computer program as recited in claim 10, wherein the routine for generating a set of interpolated projections reduces statistical noise in the projection data set.

15. The computer program as recited in claim 14, further comprising a routine for reducing an X-ray dose applied to the volume of interest in response to the reduction in statistical noise.

17. A CT image analysis system, comprising:

a distributed X-ray source, disposed on a gantry, wherein the rotational period of the distributed X-ray source about a volume of interest is greater than eight seconds, and wherein the distributed X-ray source comprises a plurality of addressable X-ray focal spots;

a detector configured to detect radiation emitted by the distributed X-ray source and to generate one or more signals responsive to the radiation, wherein the detector comprises a plurality of detector elements;

a system controller configured to control the X-ray source and to acquire a set of projection data during one or more rotations of the X-ray source about a dynamic object from one or more of the detector elements via a data acquisition system; and

a computer system configured to receive the set of projection data.

18. The CT image analysis system as recited in claim 17, wherein the computer system is further configured to generate a set of interpolated projections by interpolating the set of projection data using a set of concurrently acquired phase data and the frequency content of the set of projection data, wherein each interpolated projection characterizes the projection data set at a view location of the distributed X-ray source and at a particular time and to reconstruct the set of interpolated projections to generate one or more images.

19. The CT image analysis system as recited in claim 18, wherein the computer system is further configured to associate two or more images to generate a volume rendering.

20. The CT image analysis system as recited in claim 18, wherein the dynamic object comprises a heart having a cardiac period.

21. The CT image analysis system as recited in claim 20, wherein a rotational period of the distributed X-ray source is approximately a multiple of the cardiac period.

22. The CT image analysis system as recited in claim 18, wherein generating a set of interpolated projections reduces statistical noise in the set of projection data.

23. The CT image analysis system as recited in claim 22, wherein the computer system is further configured to reduce an X-ray dose applied to the volume of interest in response to the reduction in statistical noise.

25. A CT image analysis system, comprising:

means for rotating a distributed X-ray source about a volume of interest, wherein the rotational period of the distributed X-ray source is greater than eight seconds, and wherein the distributed X-ray source comprises a plurality of addressable X-ray focal spots;

means for emitting X-rays from the distributed X-ray source; and

means for acquiring a projection data set comprising a plurality of projections generated from the emitted X-rays.

26. The CT image analysis system as recited in claim 25, further comprising:

means for generating a set of interpolated projections using a set of concurrently acquired phase data and frequency content of the projection data set;

means for reconstructing the set of interpolated projections to generate one or more images.

9. EVIDENCE APPENDIX

None.

10. RELATED PROCEEDINGS APPENDIX

None.